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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/686,770	10/17/2003	In-sang Song	277/007	7730

7590

05/26/2005

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EXAMINER

MRUK, GEOFFREY S

ART UNIT PAPER NUMBER

2853

DATE MAILED: 05/26/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Sm

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/686,770	SONG, IN-SANG	
	<b>Examiner</b>	<b>Art Unit</b>	
	Geoffrey Mruk	2853	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 17 October 2003.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-12 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-12 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 17 October 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>16 July 2004</u> . | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Claim Objections***

Claim 4 is objected to because of the following informalities:

Claim 4 states "the cavity resonator comprises a coupling slot formed on a lower side of the cavity resonator, which is in contact with the substrate, the coupling slot receiving the cavity resonance frequency signal from the cavity resonator". In light of the specification, the source of the frequency signal as stated in claim 4 is unclear.

Appropriate correction is required.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-11 are rejected under 35 U.S.C. 102(b) as being anticipated by Lee et al. (US 4,323,908).

With respect to claim 1, Lee discloses a printer head (Fig. 1, element 10) using a radio frequency micro-electromechanical system (RF MEMS) sprayer (Column 2, lines 19-27), comprising:

- an inner pressure chamber (Fig. 1, element 17) having a liquid inlet (Fig. 1, element 22) and a liquid outlet (Fig. 1, interface between elements 11, 14, 18);
- a cavity resonator surrounding (Fig. 1, element 11; i.e. tubular) the inner pressure chamber, wherein the cavity resonator provides a predetermined cavity resonance frequency signal to increase an inner pressure of the inner pressure chamber (Column 3, lines 3-15; Column 4, lines 1-14);
- a signal transmitting unit (Fig. 1, element 37) for generating the predetermined cavity resonance frequency signal and for inputting the generated cavity resonance frequency signal into the inner pressure chamber through the cavity resonator in response to an external input control signal (Column 3, lines 16-68); and
- a liquid chamber (Fig. 1, element 16) for supplying a liquid to the inner pressure chamber, the liquid chamber being in flow communication with the inner pressure chamber through the liquid inlet,
- wherein the liquid inlet and the liquid outlet each extend through the inner pressure chamber and the cavity resonator so that when an inner pressure of the inner pressure chamber is increased by the cavity resonator, a liquid from within the inner pressure chamber is ejected outwardly through the liquid outlet (Column 2, lines 46-54).

With respect to claim 2, Lee discloses the cavity resonator is formed of a metal (Fig. 1, element 11; i.e. piezoelectric) having a hermetically sealed structure (Column 2, lines 55-66; i.e. epoxy located at the ends of the transducer).

With respect to claim 3, Lee discloses a substrate (Fig. 1, element 14) having a nozzle (Fig. 1, element 15) disposed in a position corresponding to the liquid outlet (Fig. 1, interface between elements 11, 14, 18), the substrate being welded (Fig. 1, element 18) to a lower side of the cavity resonator (Fig. 1, element 11) where the liquid outlets are formed.

With respect to claim 4, Lee discloses the cavity resonator (Fig. 1, element 11) comprises a coupling slot (Fig. 1, elements 13a, 13b; Column 2, lines 55-61; i.e. axially spaced portions) formed on a lower side of the cavity resonator, which is in contact with the substrate, the coupling slot receiving the cavity resonance frequency signal from the cavity resonator.

With respect to claim 5, Lee discloses the signal transmitting unit (Fig. 1, element 28; i.e. circuitry) is disposed at a position (Fig. 1, element 25; i.e. drive line) corresponding to the coupling slot (Fig. 1, elements 13a, 13b; Column 2, lines 55-61; i.e. axially spaced portions) with the substrate being disposed there between.

With respect to claim 6, Lee discloses the signal transmitting unit (Fig. 1, element 28; i.e. circuitry) comprises:

- a signal generator (Fig. 1, element 37) for generating the cavity resonance frequency signal; and
- a signal input terminal (Fig. 1, element 25) disposed at a position corresponding to the coupling slot (Fig. 1, elements 13a, 13b; Column 2, lines 55-61; i.e. axially spaced portions) for inputting the cavity resonance signal to the cavity resonator (Fig. 1, element 11) through the coupling slot.

With respect to claim 7, Lee discloses the signal transmitting unit (Fig. 1, element 28; i.e. circuitry) further comprises a signal amplifier for amplifying the cavity resonance frequency signal from the signal generator (Column 4, lines 4-14; i.e. change in frequency from purging air to printing).

With respect to claim 8, Lee discloses the signal transmitting unit (Fig. 1, element 28; i.e. circuitry) is disposed at a position on the substrate (Fig. 1, element 14) corresponding to the liquid outlet (Fig. 1, interface between elements 11, 14, 18), the substrate being disposed there between, the signal transmitting unit inputs the cavity resonance signal into the cavity resonator (Fig. 1, element 11) through the liquid outlet, wherein the nozzle extends to a position corresponding to the liquid outlet.

With respect to claim 9, Lee discloses the cavity resonator (Fig. 1, element 11) further comprises a coupling slot (Fig. 1, elements 13a, 13b; Column 2, lines 55-61; i.e. axially spaced portions) formed on a side of the cavity resonator for receiving the cavity resonance frequency signal (Fig. 1, element 37) into the cavity resonator.

With respect to claim 10, Lee discloses the liquid inlet (Fig. 1, element 22) prevents a liquid inside the inner pressure chamber (Fig. 1, element 17) from flowing back into the liquid chamber (Fig. 1, element 16) when an inner pressure of the inner pressure chamber is increased by the cavity resonator (Column 2, lines 66-68; Column 3, lines 1-2; i.e. taper of element 22).

With respect to claim 11, Lee discloses the substrate (Fig. 1, element 14) further comprises a plurality of nozzles (Column 1, lines 7-23), each nozzle (Fig. 1, element 15)

corresponding to a position of one of a plurality of liquid outlets (Fig. 1, interface between elements 11, 14, 18).

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lee et al. (US 4,323,908) in view of Ohashi (US 5,825,386).

Lee discloses the inner pressure chamber (Fig. 1, element 17) surrounded by the cavity resonator (Fig. 1, element 11).

Lee fails to disclose the plurality of inner pressure chambers, each being surrounded by a respective one of a plurality of cavity resonators, and wherein each of the plurality of inner pressure chambers is disposed at a predetermined distance interval from an adjacent one of the plurality of inner pressure chambers.

Ohashi discloses a plurality of inner pressure chambers (Fig. 1, array of element 1), each being surrounded by a respective one of a plurality of cavity resonators (Fig. 1, array of element 4), and wherein each of the plurality of inner pressure chambers is disposed at a predetermined distance interval from an adjacent one of the plurality of inner pressure chambers (Column 7, lines 4-12; i.e. pitch of element 21).

At the time of the invention, it would have been obvious to use the teachings of Ohashi for the drop on demand ink jet print head of Lee. The motivation for doing so would have been to "provide an ink-jet device that may require only a low voltage and can be made small in size" (Column 2, lines 32-34).

### ***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Jeong et al. (US 6,416,172 B2) discloses an ink-jet head device using a stack of piezoelectric bodies.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Geoffrey Mruk whose telephone number is (571) 272-2810. The examiner can normally be reached on 7am - 330pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Meier can be reached on (571) 272-2149. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.



Art Unit: 2853

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

GSM  
5/17/2005

GM

  
MANISH S. SHAH  
PRIMARY EXAMINER

5/23/05